

TRB's Field Visit Program

Transportation Professionals Foster Technology Transfer



Each year Transportation Research Board staff representatives visit every state highway and transportation department, many universities, transit and other modal agencies, and industry groups. The objectives of this field visit program are to (a) learn of problems facing an organization and to pass on information pertinent to the solution of these problems; (b) learn of research activities in progress or contemplated and inform the organization of similar research being carried out elsewhere, thus preventing duplication of efforts; and (c) identify new methods and procedures.

These annual visits provide the opportunity to collect and share transportation research information. Other forms of

information exchange such as publications and automated services are available, but the visit program offers the unique advantage of one-on-one discussions to explore areas of mutual interest. Personal visits also identify innovative or experimental work that will not be published for wide dissemination, but nevertheless is worth bringing to the attention of others.

Another benefit from the program is the opportunity to describe TRB's range of services to new people in the transportation agencies that support the Board. The visits also serve to identify potential candidates for TRB standing committees, National Cooperative Highway Research Program (NCHRP) panels, and special project committees.

This past year was an exciting one for the transportation community. Among the news-making projects were the development of a national policy by the U.S. Department of Transportation, consensus-building initiatives to define program emphasis areas, and legislative proposals including new funding structures. The research community focused on calls for higher funding levels for research, new proposals for special programs such as intelligent vehicle-highway systems (IVHS), the U.S. DOT's transportation technology exhibition (TransExpo) at the TRB Annual Meeting, and the first products from the Strategic Highway Research Program (SHRP).

These topics, along with many others, were discussed with hundreds of transportation professionals by TRB staff members over the past year. The following is a summary of transportation issues, trends, and research activities identified during fiscal year 1990 visits and through other staff efforts.

Planning

During one visit, a request was made for TRB to undertake a survey on statewide planning. As a result, TRB conducted a survey during a conference cosponsored with the American Association of State Highway and Transportation Officials in mid-1989 and through a mail follow-up to those states not represented at the conference. The highlights of the survey revealed that

- The majority of states have an up-to-date highway plan that contains a financial component as well as a priority program of improvements.
- Increasing attention is being paid to the development of plans for the other modes (transit, rail, aviation, and waterways).
- Although the majority of states responding maintained that their planning efforts were short term, many are again emphasizing long-term planning.

• A significant number of states have established a strategic planning process to guide the traditional process by identifying emerging trends and factors that could have a major impact on transportation, the department, and the process itself.

• States are concerned about the need to redefine federal, state, and public-private sector roles in the face of increasing federal withdrawal from the state and local scene. They are also giving increased attention to the land use-transportation relationship, multimodal planning, environmental and energy issues, and the role of advanced technologies.

• Increased attention is also being paid to incident management, access control, corridor conservation, demand management, increased worker productivity, and geographic information systems.

Finance

Last year, total state motor fuel tax collections increased by 9.5 percent and motor vehicle and operator's license taxes rose by 7.5 percent. The average state gasoline tax was 16 cents per gallon.

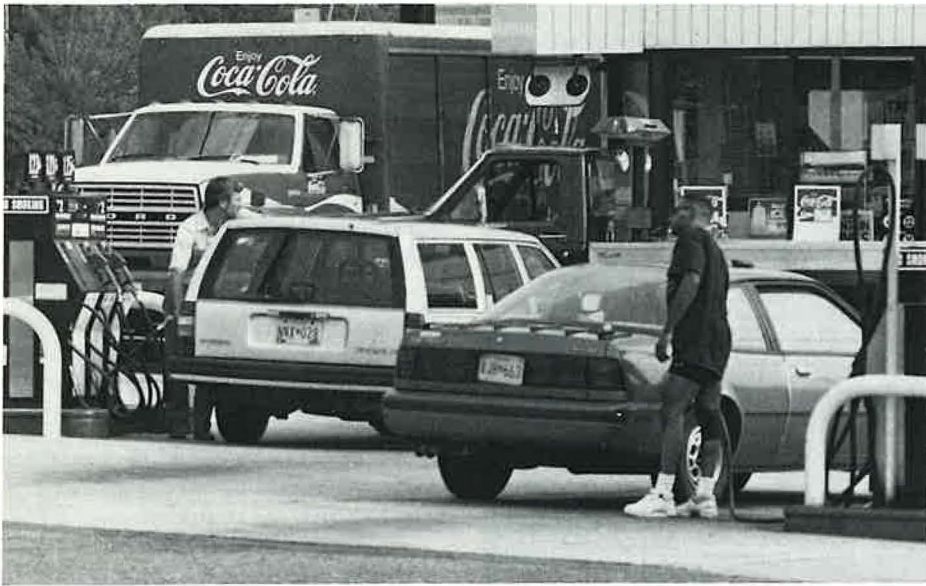
More than one-third of the states raised their motor fuel taxes last year. An additional third are considering issuing bonds to fund highway construction programs, and about a third of the states are considering increasing truck taxes. Twelve states have motor fuel taxes of 20 to 22 cents per gallon. Only six states have a gasoline tax of less than 10 cents per gallon. These continual increases in fuel taxes have kept highway programs just equal to the rate of inflation. The constant 9 cent federal gas tax is declining in real purchasing power each year.

Most states share a portion of the state gasoline taxes with county and local governments. An increasing number of states are empowering local governments with the option to levy local motor fuel taxes in addition to the state taxes.



TransExpo, a transportation technology exhibition sponsored by the U.S. Department of Transportation, attracted large crowds at TRB's Annual Meeting in January of this year.

Photo on previous page: Members of TRB Committee on Highway Capacity and Quality of Service visit Athabasca glacier near Edmonton, Alberta, Canada, during mid-year meeting.



Legislation is under consideration by Congress to increase federal tax on gasoline to help reduce deficit.

Thirteen states and the federal government currently have a lower tax rate on motor fuels containing 10 percent or more alcohol. The Federal Highway Administration estimates that this exemption has resulted in a \$2.3 billion reduction of federal tax revenues and will cost an additional \$1 billion a year if the Clean Air bill requires oxygenated fuels in critical urban areas.

Because the Highway Trust Fund and the Aviation Trust Fund balances are used to help offset the deficit calculations under the Gramm-Rudman law, there has been a reluctance to spend these trust funds down to the minimum needed to meet obligations. There are unobligated balances of \$10 billion in the Highway Trust Fund, \$14 billion in the Aviation Trust Fund, and \$6.4 billion in the Transit Trust Fund.

Several bills have been introduced in Congress to increase the tax on gasoline for deficit reduction. Although none of these proposals has been successful so far, the debate continues: should the United States follow other countries in Europe and Asia that use taxes on gasoline for general revenue purposes?

Human Resources

Many states continue to experience a high retirement rate of engineers. Some states have experienced problems in recruiting entry-level engineers; however, most of the problems have been the result of limitations in the recruiting process itself. Civil service requirements and the inability of state recruiters to tender immediate offers, as the private sector does, often result in the loss of potential candidates.

Further, forecasts of available entry-level civil engineers for transportation indicate a severe shortage in the future. The number of U.S. citizens entering civil engineering schools has declined in recent years and there is a growing recognition that if the state DOTs are to obtain adequate engineering staff, it will be necessary to find ways to encourage college students to select civil engineering careers.

Environment

Noise

Noise abatement measures have become integral parts of highways traversing

built-up urban areas, but there is increasing concern about the cost-effectiveness of the abatement measures used. Innovative materials with greater absorption characteristics are needed, and improved design, engineering, and construction methods must be found to cope with the cost-cutting pressures faced by the states.

In response to rising public complaints about aircraft noise, sound insulation modification of buildings has been found to be an effective way to mitigate inside noise. There are, however, no standardized insulation techniques for buildings to mitigate aircraft or other outside noise. Guidelines are needed to help designers select the best insulation materials and methods.

Air Quality

Although the number of violations of air quality standards has continued to decrease since the 1970s, progress toward meeting those standards has been less than satisfactory in at least 27 cities. With as much as 50 percent of ozone precursors and 60 to 90 percent of carbon monoxide emissions coming from vehicles, local, state, and national governments have implemented far-reaching measures designed to change traditional driving habits of millions of Americans.



In-vehicle driver information systems include head-up display feature that enables drivers to receive critical information without taking their eyes off the road.



Maryland Governor W. D. Schaefer and State Highway Administrator H. Kassoff discuss Adopt-A-Highway program, designed to encourage public to maintain clean roadside environment, with local scout troop.

The new Clean Air Act being considered by Congress would require tailpipe emission reductions and tightened inspection and maintenance of automobile emission control systems, as well as implementation of new particulate standards for buses. The nine worst ozone areas would have to use oxygenated fuels, and large employers in these and "extreme" carbon monoxide areas would be subject to fines if average employee vehicle occupancy were less than 20 percent above the regional average.

Some of the most drastic restrictions on everyday activities to reduce air pollution are envisioned for the Southern California area. They include banning 70 percent of large trucks from city streets during rush hours, limiting the number of automobiles each family can have, increasing registration fees for motorists with more than one automobile, and raising parking fees for single-occupant automobiles.

The transit industry is especially affected by the Environmental Protection Agency's impending 1991 particulate standards. Even though methanol-powered buses have been in operation

for a number of years in several parts of the country, transit authorities are reluctant to risk procuring alternative-fueled buses and may simply defer new bus purchases until development of the clean diesel engine systems has advanced further.

An alternative fuels program is an important component of an effective mobile source control strategy. Considerable research effort is going into the development of cleaner fuels, including ethanol, methanol, compressed natural gas and propane, and other vehicle propulsion systems, such as electricity.

Wetlands

Wetland replacement is a major impediment in the construction or improvement of many highway projects. One of the main problems has been that new wetlands created to replace those taken for a project are not of the same quality as the older ones that are lost.

President Bush has pledged "no net loss of wetlands." The U.S. Army Corps of Engineers and the EPA signed a memo-

randum of agreement on February 6, 1990, establishing a mitigation framework to ensure that consistent procedures will be used in wetlands mitigation actions.

Hazardous Materials

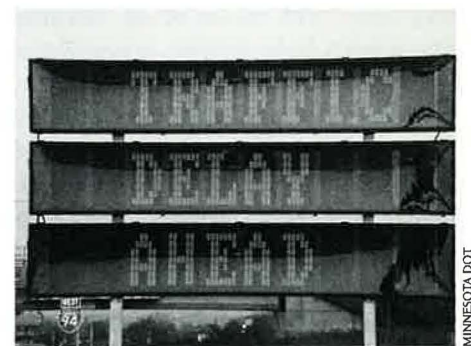
Another issue of environmental concern is contamination of the subsurface environment from leakage of gasoline from underground storage tanks. More frequently states are being faced with the problem of containment of hazardous wastes and mitigation of contaminants found along highway corridors.

Design

States are reporting that higher percentages of their design work are being carried out by consultants, in part because of funding allocations that affect their ability to hire in-house design engineers.

Asphalt concrete pavement problems in some states are partly blamed on high tire pressures on overloaded trucks. Experimental pavement sections to evaluate asphalt modifiers (polymers) and aggregate quality are being built and evaluated.

There is growing recognition that public agencies and private industry need better communication to more effectively address design issues. Two sessions held at the 1990 TRB Annual Meeting on Vehicle/Pavement Interface—The Com-



Safe movement of traffic through maintenance work zones continues to be a major goal of state highway agencies.

mon Ground, brought together public and private interests to share information.

The FHWA bridge rail requirements are resulting in expensive state retrofit programs. Installing bridge rails having the required strength on the more than 50,000 timber bridges in the United States is a special problem because of connection requirements.

The TRB Committee on Landscape and Environmental Design recently completed a four-year collaboration with the AASHTO Subcommittee on Design to revise the 1970 AASHTO *Guide for Highway Landscape and Environmental Design*. Publication by AASHTO is expected in 1990.

Materials and Construction

Quality assurance is the primary concern of the states in construction engineering management. The need for improvements was confirmed in a recently completed pooled-fund TRB study sponsored through the FHWA by 18 states. A priority program of \$45 million to address the top 16 research problems was recommended in the final report, *Research and Development Program for Highway Construction Engineering Management*. The development of performance-based specifications for highway construction and the development of more effective rapid test methods and procedures account for approximately 80 percent of the recommended research funds.

With so much construction now being performed under traffic conditions, it has become increasingly important for states to finish jobs quickly and to use materials that provide for minimal interruptions to the traveling public and still perform to acceptable standards. The traditional testing methods and procedures cannot accommodate the accelerated pace of construction, hence the need for more effective rapid testing procedures.

States are becoming interested in exploring innovative contracting prac-



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tices. A TRB task force has been evaluating the possibilities and options and expects to publish its report this year.

A number of states are experimenting with large-stone mixes to minimize rutting in asphalt pavements. Because large-stone mixes may produce cracking in the pavement surface, experiments are being performed on the use of chip seals for high-traffic pavements, an approach traditionally reserved for low-volume roads.

There is growing concern about the alkali-aggregate reaction in concrete. Older portland cement concrete pavements are showing signs of cracking, suspected to be caused by the alkali reactivity. Fly ash is one of the additives being used to reduce the alkali-aggregate reaction.

Soils, Geology, and Foundations

Approximately one-third of the states are using dynamic devices such as pile-driving analyzers to estimate pile capacities and to study other aspects of

pile-driving performance. Interest has increased in the in situ subsurface investigation techniques that use the cone penetration test, dilatometer test, and pressuremeter.

Most states are now constructing and stabilizing slopes and embankments using geosynthetic reinforcements. However, there is concern about how to evaluate the geosynthetics so that proper material specifications can be developed.

There is also growing concern about sealing geotechnical exploratory holes. Proper and adequate sealing is needed to prevent pollution of groundwater and the subsurface environment. A TRB conference and an NCHRP project will address this issue.

Maintenance

The workload required to maintain the nation's aging highway infrastructure is increasing at an alarming rate. To add to this workload, there are continued pressures to reduce the number of state employees and maintenance expenditures. In addition, there are demands to comply with new environmental, health, and safety regulations. To address these challenges in the short term, many DOTs are looking for ways to improve maintenance operations efficiencies and are shifting roadway maintenance funds to activities necessary to comply with new regulations and thus postponing needed roadway maintenance. For a long-term solution, DOTs are working with health, safety, and environmental agencies at the local, state, and federal levels to (a) identify corrective measures and associated costs, (b) improve the efficiency of their maintenance management systems, (c) look for improved roadway materials and means of automating some of the basic roadway maintenance activities, optimizing the use of contractor assistance, and (d) use advanced technologies to reduce the cost of snow and ice control.

The safe movement of traffic through maintenance work zones continues to be a major goal of state highway agencies. Increased use of truck-mounted crash



MOORE/CONNECTICUT DOT

High-occupancy vehicle lanes are important elements of transportation management programs in more than 20 urban areas and are under consideration in other areas.

cushions and adherence to standard traffic control plans are noted in most states.

Most maintenance activities are labor intensive. Recruitment and training of maintenance employees is a major activity, and retention of new employees continues to be a problem in most urban areas. The states have high expectations for the results of several SHRP research efforts to reduce staffing needs through automated roadway maintenance operations.

There is a continued dependence of state highway agencies on contractor assistance to accomplish needed highway maintenance. In many states this assistance is being used to replace and repair safety appurtenances, remove ice and snow from the roadway, mow grass on the right-of-way, operate roadside rest areas, repair bridges and concrete surfaces, and overlay existing roadway surfaces. The results of contracting efforts have been mixed and the success is heavily dependent on the cooperation achieved among state administrators and contractors.

Winter maintenance activities account for a significant portion of the total main-

tenance budget in most northern states. To improve the efficiency of these activities, many states are conducting storm-monitoring demonstration projects.

Traffic Operations and Safety

Traffic Operations

The increasing traffic congestion in many urban and suburban areas has created the need for additional highway capacity. With the limited financial resources of government agencies to build new freeways or expand existing highways, traffic engineers are seeking new ways to add capacity within the existing rights-of-way through more effective use of existing pavement width, improved traffic control, and other strategies.

One method being implemented in several states and proposed in others to use existing pavement width more efficiently is to add lanes to a freeway through the use of existing shoulders. These lane additions are frequently accomplished without reducing the width of existing lanes; however, reduced lane widths are being used when necessary. The benefits of this approach include quick, low-cost implementation with minimal community impact. Another approach is to reduce traffic demand during peak periods of the day, for example by providing high-occupancy vehicle (HOV) lanes. These

restricted-use lanes are an important element of transportation management programs in more than 20 urban areas and are under consideration in many others. Because of the preferential treatment that HOV participants receive at freeway ramps and through lanes, traffic moves at a steady and more efficient rate.

Nonrecurring traffic congestion resulting from freeway emergencies is also a serious and growing problem. Typically, freeway incidents account for more than 50 percent of the delay on the nation's urban freeway system. Traffic management techniques to reduce the duration of an incident and to efficiently manage traffic during the incident are therefore subjects of considerable interest.

The IVHS continues to attract interest in both the public and private sectors and is a major element of the U.S. DOT's National Transportation Policy. The IVHS concept incorporates advanced traffic management systems, in-vehicle driver information systems, automated vehicle control, and automatic vehicle identification and location for heavy vehicle and commercial operations into a real-time system that can contribute substantially to reduced vehicle delay, increased highway capacity, and improved highway safety.

Safety

The primary indicator of safety performance took a positive turn in 1989. Fatalities were down to 45,500 from 47,093 and the death rate was 2.2 per 100 million vehicle miles. Although this meets President Bush's goal of "2.2 by '92," a few years' experience will be needed to see if this is a stable trend.

Although 85 percent of the U.S. population lives in states that have safety belt use laws, the use rate remains around 46 percent—a disappointing number. A National Highway Traffic Safety Administration study found benefits from very high belt use would be greater than just a linear extrapolation from current benefits. For example, an estimated 4,573 lives were saved by the use of belts in 1988 (45 percent use rate). If that rate had been 80 percent, 11,101 lives could have been



LARIV/PUERTO RICO DOT

Segmental bridge construction in Puerto Rico.

saved. TRB completed a study, *Special Report 224: Safety Belts, Airbags, and Child Restraints*, which identified the research needed to realize the higher use rates and to continue improving occupant restraint effectiveness.

A high level of interest in the older driver continued during 1989. The NHTSA analyzed accident data and confirmed that the risk of fatal injury for drivers over 70 years of age is about three or four times greater than it is for younger drivers. This study also confirmed the high crash involvement rate, based on miles traveled, of drivers over 80 years old. The absolute number of crashes and the crash rate, using population as the base, are still quite low compared with that of the rest of the population. There is uncertainty and variability among the states about the type and extensiveness of engineering changes to accommodate older drivers, but there is consensus that such changes will have safety benefits for drivers of all ages.

Alcohol continues to be a major contributor to traffic crashes, but progress is evident. NHTSA noted a decrease of 17 percent in alcohol involvement in fatal crashes from 1982 through 1987. On the other hand, a University of North Carolina study identified an increased percentage of younger women driving while impaired.

The effects of the 65 mph speed limit on some rural Interstate highways continues to be monitored. Analysis of the 1988 data, detailed in a NHTSA/U.S. DOT Report to Congress, found a 21 percent increase in fatalities on rural Interstates after correcting for increased miles traveled. Higher speed variance and a greater number of drivers going over 70 mph were noted.

The hazard elimination program carried out by the states was evaluated for the decade 1979 to 1989. Approximately 9,000 lives were saved and 200,000 injuries prevented. The next evolution in this program is corridor improvements. Pennsylvania is developing an implementation package and will conduct demonstration projects in cooperation with several other states.



New light rail systems are planned or under construction in about 20 U.S. cities. Nine miles of planned 20-mile-long Santa Clara County Transportation Agency's light rail line is now in operation.

Transit, Aviation, Rail, and Water Transportation

Transit

Assurance of a reliable funding source is the major concern of most transit officials. They believe that transit's major financial difficulties stem from the lack of dedicated transit funds, inequity in the sharing of the federal transportation money, and many hidden government policies that favor private means of transportation. For example, the tax code allows unlimited deduction of employer-provided free parking, but employees who receive transit subsidies of more than \$15 do not receive a tax-free benefit. Similarly, many officials believe that it is wrong that cities compete for federal transit funds on the basis of the percentage of local funds that will be used as a match. No other mode is required to undergo such competition for federal funds.

The states continue to play a growing role in transit. In 1989 the states provided \$4.2 billion to the nation's public transit systems compared with \$3.2 bil-

lion provided by the federal government.

Many of the rural and small urban transit agencies are faced with the need to replace old and worn-out equipment. When federal funds became available in 1983, there was an immediate increase in new systems and many existing agencies added new small vehicles to their fleet. This equipment is reaching its five- to seven-year useful life and must be replaced.

Light rail transit continues to attract the attention of the public. There is also a strong emerging interest in commuter rail. At least six U.S. cities are adding new or expanding existing commuter rail service. Part of the appeal of this proven transportation mode is that many cities have unused and underused rail corridors that can provide rights-of-ways at low cost.

Transit agencies are uncertain of the financial implications of carrying out the new requirements of the Americans with Disabilities Act (ADA). This civil rights law will not provide additional funding but will impose stringent regulations. Already questions of interpretations of ADA provisions such as eligibility requirements, response time, and comparable level of service to fixed route service have arisen.

There is clear indication of a renewed interest in transit research. At the federal level there is serious talk about a different funding arrangement to pay for transit planning and research, a number of transit agencies are undertaking specialized studies within their own organizations, the University Transportation Centers Program offers a unique opportunity to leverage research funds, and the AASHTO Standing Committees on Research and on Public Transportation have ongoing programs to encourage states to become more actively involved in public transportation research. In addition, there is a strong likelihood that in the near future a National Strategic Transit Research Program will be established that will address problems of the transit operating community.



Passing of Americans with Disabilities Act will require that new and rehabilitated buses, rail transit stations, and other facilities be accessible to handicapped.

Aviation

Deregulation, which has contributed to a doubling of passenger travel in the past decade, continues to be a dominant theme in civil aviation. U.S. airlines appeared to be "catching their breath" in 1989—consolidating their market position, ordering new aircraft, and poising themselves for a new phase of competition. The financial performance of the major U.S. airlines suggests that a new round of mergers and consolidation may be developing. Many experts predict that the next few years will see concentration of the industry into five or possibly six major firms.

This trend will not be confined to the United States. The airlines of Europe, preparing for the integration of the European Economic Community in 1992, are realigning themselves and seeking marketing alliances, a share of ownership, and reciprocal operating agreements with U.S. and Far Eastern carriers and with small nationally owned airlines of the Middle East, Africa, and Latin America.

These prospects have given rise in the United States to appeals for a new, comprehensive federal policy for aviation.

The most frequently cited areas in which federal policy and leadership are needed include coordinated development of the airports and airways system, regulatory reform to give all parts of the aviation community the same degree of economic freedom now enjoyed by airlines, new approaches to funding and financing capital improvements, and increased support for research and development and technological innovation.

Many of the concerns about present and future aviation policy come into focus at the nation's airports, especially those that are major air traffic hubs. The capacity of these key airports to handle the present level of demand is severely strained. A study conducted by the TRB in 1989 concluded that the capacity of the airport system might need to be doubled over the coming 20 to 30 years and outlined a variety of strategies that the Federal Aviation Administration might adopt to meet this need.

Perhaps the most divisive issue raised by the prospect of expanding airport system capacity is aircraft noise. Any strategy pursued by the FAA and an essential

feature of national aviation policy will be a workable compromise between aviation interests and affected communities on controlling aircraft noise.

The funding of future airport and airways improvements is another question that national aviation policy must address. The mounting surplus in the Airport and Airways Trust Fund, created by congressional efforts to limit the federal budget deficit by reducing Trust Fund outlays, has become an increasingly contentious issue. The national transportation policy proposed by the Administration recognizes that Trust Fund monies should be used to meet the needs of aviation and also calls for new sources of revenue. Among these are increases in the taxes that now support the Trust Fund, new user fees, and locally imposed charges, known as passenger facility charges, that are levied by airports on airline passengers.

An issue that underlies nearly every aspect of aviation policy is the relationship among federal, state, and local governments to planning, development, and operation of the air transport system.



National Airport in Washington, D.C., is being enlarged and renovated. TRB *Special Report 226* study concluded that capacity of major airports is severely strained now and will be insufficient to handle future levels of demand.